Dynamics of the Vietnamese Shelf and Slope

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LONG-TERM GOALS

We want to test our dynamical understanding of coastal currents by comparing conceptual and numerical models with highly resolved ocean observations.

OBJECTIVES

We seek to understand the dynamical processes that govern flow over the Vietnamese shelf and slope by use of observations (*in situ* and remote) and process-oriented numerical models.

APPROACH

Observations (Brink and Shearman, leaders): In collaboration with Vietnamese scientists, we will carry out two seagoing efforts during 2003. Much of the thinking to date relies on observations reported by Wyrtki (1961).

We hypothesize that, during the winter (northeast) monsoon, flow over the shelf will be dominated by buoyancy-driven currents associated with runoff from the land. We expect that there will be pronounced fronts over the midshelf (associated with local rivers), and another near the shelf edge that would be analogous with the shelfbreak front in the Middle Atlantic Bight (e.g., Linder and Gawarkiewicz, 1998). Both fronts are expected to be highly variable due to wind fluctuations and instabilities. Our February seagoing work will involve two ships, the R/V *Thompson* and the Vietnamese R/V *Nghien Cuu Bien*. Both will carry out station hydrography, and towed, undulating

body (SeaSoar or Minibat, respectively) measurements. Repeated, well-resolved surveys will be carried out in order to characterize the modes of variability. Both the wide shelf near 10°N and the very narrow shelf near 12°N will be sampled (figure 1) in order to detect variations associated with topography.

We hypothesize that during the southwest (summer) monsoon, there will be active wind-driven upwelling over the shelf, and that buoyancy-driven currents will be of secondary importance. We expect to observe cool surface filaments, such as those seen off California (e.g., Brink and Cowles, 1991). The summer cruise will involve one ship (the R/V *T.G. Thompson*), and will concentrate on SeaSoar and station observations, the structure of coastal upwelling, of the upwelling front, and of filamentary structures offshore of the shelfbreak. Repeated sampling will again be used to characterize, thoroughly, time variations. Again, sampling will take place off of both southern and central Vietnam.

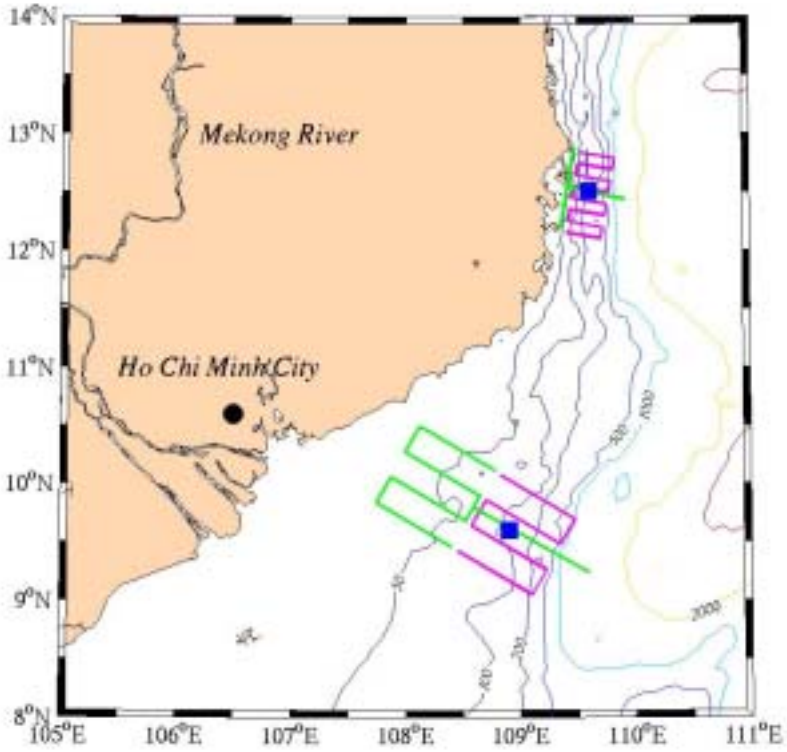

Figure 1: Proposed sampling areas off of Vietnam. The green tracks will be sampled in February 2003 by the R/V Nghien Cuu Bien and the cyan tracks by the R/V Thompson. During Summer, 2003, the R/V Melville will sample both areas. Cruise tracks shown are schematic and only meant to signify the general areas to be studied.

Modeling (Chapman, leader): Our plan of attack is to examine the response of the shelf and slope regions to forcing by winds, river outflows and remote processes, applied individually and then in combination. We will use the Regional Ocean Model System (ROMS) from the Rutgers University group. This is a well-tested model that incorporates sophisticated advection schemes and a flexible topography-following s-coordinate in the vertical. We will configure the model with realistic coastline and bottom topography and apply both idealized and realistic forcings.

WORK COMPLETED

In preparation for the 2003 cruises, we have started the process of upgrading our SeaSoar equipment and software. In addition, Shearman has visited Vietnam in order to begin cooperation with Vietnamese oceanographers.

RESULTS

None to date.

IMPACT/APPLICATIONS

The Vietnamese coastal region represents an opportunity to test *a priori* predictions about currents and hydrography in a coastal region subject to strong river runoffs and monsoonal forcing. Our observations will thus be a test of the depth of our current understanding. Further, we expect to build bridges to the Vietnamese oceanographic community and to exchange expertise with them.

TRANSITIONS

None to date.

RELATED PROJECTS

None.

REFERENCES

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